

claims 1 and 6 as they were filed well after the August 29, 1994 effective filing date of the present application.

Claim 9 has been cancelled from the application.

The preamble of each of claims 1 and 6 has been amended simply to clarify that the purpose of the protective fabric substrate of the present invention is to protect against puncture, penetration and/or ballistics.

In the Office Action, the Examiner rejected claims 1-4 and 6-8 as being unpatentable over the Harpell et al. '280 patent. The Examiner notes that Harpell et al. describes three-dimensional fibrous structures which are designed for penetration resistance for projectiles with a plurality of layers which can be aligned parallel and other layers can be rotated so that the successive layers can be at different angles with respect to the previous layer in order to achieve penetration resistance.

It seems the Examiner may have somewhat misunderstood details of the present invention.

Specifically, the present invention, as recited in claim 1, is directed to a protective fabric substrate including a plurality of warp yarns densely interwoven with a plurality of fill yarns. The denier of the fill yarn is not equal to a denier of the warp yarn.

As described in the detailed description portion of the application, beginning on page 3, line 29, normal density fabrics, such as those 50x50 (i.e., 50 warp yarns to the inch by 50 fill yarns to the inch), at 200 denier, have little resistance to penetration, even when used in multiple layers. The present invention, by contrast with those normal density fabrics, is directed to a protective fabric having extremely high penetration resistance. This is achieved by using a structure, referred to herein as "densely"

interwoven (as defined in the spec), ranging from 90x88 to 130x86 at 200x200 denier, and from 100x68 to 130x65 at 200x400 denier.

Prior to Applicant's invention, such a "densely" interwoven structure, wherein a denier of the fill yarn is not equal to a denier of the warp yarn, had not been used. Applicant discovered a way to densely weave such yarns in an imbalanced structure (denier of the fill yarn is not equal to a denier of the warp yarn) to achieve a protective fabric substrate.

Applicant has achieved tremendous commercial success and industry recognition with his protective fabric product, called Turtleskin®, produced in accordance with the invention.

The Harpell et al. patent does not disclose or suggest the protective fabric as claimed by Applicant. The Examiner admits that Harpell et al. fails to disclose warp and crimp yarns. Such elements are the crux of Applicant's invention. It is the very structure of densely interweaving warp yarns with crimp yarns wherein the denier of the fill yarn is not equal to the denier of the warp yarn that enables the substrate to achieve significant penetration resistance. Applicant discloses in detail in the specification portion of the application how one skilled in the art can carry out the invention, enabling one to weave such a structure.

By contrast with the present invention, in which a fabric substrate comprises a plurality of warp yarns densely interwoven with a plurality of fill yarns, Harpell et al. instead relies on stacking multiple layers, some having a different orientation from the others. Nowhere in Harpell et al. is it disclosed or suggested that any single layer have warp yarns densely interwoven with fill yarns. Harpell et al. simply did not invent the

same. In fact, Harpell et al. in some ways teaches away from the present invention where it states that, "preferably all fibrous layers are aligned in a parallel or substantially parallel and uni-directional fashion". In the densely interwoven fabric substrate of the present invention, the warp yarns are substantially perpendicular to the fill yarns.

The Examiner contends that it would have been obvious to one of ordinary skill in the art to modify the fibers and layers of Harpell et al. motivated with the expectation that the rearranging involves one of routine skill. Applicant disagrees.

Prior to Applicant's invention, it was difficult to achieve a weave in any one layer wherein warp yarns are densely interwoven with fill yarns, as "densely" is defined in the spec, especially in which a denier of the fill yarn is not equal to a denier of the warp yarn, to achieve a protective fabric substrate. Applicant was the first to discover how to do the same and, again, has achieved tremendous commercial success with his product, Turtleskin®, realized under the present invention. Applicant requests that the Examiner cite a prior art reference which discloses the claimed invention. Specifically, Applicant requests that the Examiner cite a prior art reference which discloses a fabric substrate comprising a plurality of warp yarns densely interwoven with a plurality of fill yarns, wherein a denier of the fill yarn is not equal to a denier of the warp yarn. Applicant believes that the Examiner will not be able to do so as Applicant conducted extensive industry-wide prior art research before embarking on his product and patent application. Despite extensive searching, we found no single one piece of prior art which discloses or suggests the invention.

For these reasons, claim 1 is allowable.

Each of claims 2-5 which depends from and further limits claim 1, is allowable for at least the same reasons.

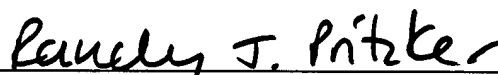
Claim 6 is similar to claim 1 except it also claims that a warp crimp is greater than a fill crimp and a denier of the fill yarn is greater than a denier of the warp yarn. Neither of these additional features is disclosed or suggested by Harpell et al., and claim 6 is allowable for the same reasons as claim 1 plus these additional reasons.

Each of claims 7 and 8 depends from and further limits claim 6 and is allowable for at least the same reasons.

Claims 1-9 also were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent No. 5,837,623. Accordingly, Applicant files herewith a terminal disclaimer over the '623 patent.

Based on the foregoing, the present application is now in condition for allowance. A notice to that effect is respectfully requested. The Examiner is invited to call Applicant's attorney at the number listed below to further the prosecution of this application in any respect.

Respectfully submitted,


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MARKED-UP CLAIMS

1. (Amended) A protective fabric substrate for protection against puncture, penetration and/or ballistics comprising:

a plurality of warp yarns densely interwoven with a plurality of fill yarns;
wherein a denier of the fill yarn is not equal to a denier of the warp yarn.

6. (Amended) A protective fabric substrate for protection against puncture, penetration and/or ballistics comprising:

a plurality of warp yarns densely interwoven with a plurality of fill yarns;
wherein a warp crimp is greater than a fill crimp; and
wherein a denier of the fill yarn is greater than a denier of the warp yarn.

MARKED-UP SPECIFICATION

Please rewrite the paragraph beginning at line 3 of page 1 as shown.

This application is a divisional of application [of] serial no. 09/037,918, filed March 10, 1998, now U.S. Patent No. 5,976,996 which, in turn, is a continuation of application serial no. 08/729,926, filed October 15, 1996, now U.S. Patent No. 5,837,623 which, in turn, is a continuation-in-part of application serial no. 08/297,593, filed August 29, 1994, now U.S. Patent No. 5,565,264.